

Appl. No.: 09/881,620
Reply to Office Action of Apr. 01, 2003

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This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

Claim 1 (currently amended). A method of producing optical emissions from a target source, comprising the steps of:

forming a metallic solution that includes molecular liquids or mixtures of elemental and molecular liquids at room temperature;

passing the metallic solution in microscopic droplets, each having a diameter of approximately 10 micrometers to approximately 100 micrometers into a target source; and

irradiating the target source with a high energy source to produce optical emissions that are debris free and cannot cause debris damage to surrounding components.

Claim 2 (original). The method of claim 1, wherein the high energy source includes; a laser source.

Claim 3 (original). The method of claim 1, wherein the optical emissions include: X-rays.

Claim 4 (original). The method of claim 1, wherein the optical emissions include: EUV (extreme ultraviolet) wavelength emissions.

Claim 5 (original). The method of claim 1, wherein the optical emissions include: XUV wavelength emissions.

Claim 6 (currently cancelled).

Claim 7 (currently amended). The method of claim 6 1, wherein the microscopic droplets each include: diameters of approximately 30 micrometers to approximately 90 micrometers.

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Claim 8 (original). The method of claim 7, wherein the microscopic droplets each include:
diameters of approximately 40 micrometers to approximately 80
micrometers.

Claim 9 (currently amended). The method of claim 1, wherein the metallic solution includes: a
metallic chloride solutions.

Claim 10 (currently amended). The method of claim ~~7~~ 9, wherein the metallic chloride solution
includes: ZnCl(zinc chloride).

Claim 11 (currently amended). The method of claim ~~7~~ 9, wherein the metallic chloride solution
includes: CuCl(copper chloride).

Claim 12 (currently amended). The method of claim ~~7~~ 9, wherein the metallic chloride solution
includes: SnCl(tin chloride).

Claim 13(currently amended). The method of claim ~~7~~ 9, wherein the metallic chloride solution
includes: AlCl (aluminum chloride).

Claim 14(original). The method of claim 1, wherein the metallic solution includes:
a metallic bromide solution.

Claim 15(original). The method of claim 14, wherein the metallic bromide solution includes:
CuBr(copper bromide).

Claim 16(original): The method of claim 14, wherein the metallic bromide solution includes:
ZnBr(zinc bromide).

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Claim 17(original). The method of claim 14, wherein the metallic bromide solution includes:

SnBr(tin bromide).

Claim 18(original). The method of claim 1, wherein the metallic solution includes:

a metallic sulphate solution.

Claim 19(original). The method of claim 18, wherein the metallic sulphate solution includes:

CuSO₄(copper sulphate).

Claim 20(original). The method of claim 18, wherein the metallic sulphate solution includes:

ZnSO₄(zinc sulphate).

Claim 21(original). The method of claim 18, wherein the metallic sulphate solution includes:

SnSO₄(tin sulphate).

Claim 22(original). The method of claim 1, wherein the metallic solution includes:

a metallic nitrate solution.

Claim 23(original). The method of claim 22, wherein the metallic nitrate solution includes:

CuNO₃(copper nitrate).

Claim 24(original). The method of claim 22, wherein the metallic nitrate solution includes:

ZnNO₃(zinc nitrate).

Claim 25(original). The method of claim 22, wherein the metallic nitrate solution includes:

SnNO₃(tin nitrate).

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Claim 26(original). The method of claim 1, wherein the room temperature includes:
approximately 10 degrees C to approximately 30 degrees C.

Claim 27(original). The method of claim 1, wherein the optical emissions include:
approximately 11.7nm.

Claim 28(original). The method of claim 1, wherein the optical emissions include:
approximately 13nm.

Claim 29(original). The method of claim 1, wherein the metallic solution includes:
an organo-metallic solution.

Claim 30(original). The method of claim 29, wherein the organo-metallic solution includes:
CHBr3(Bromoform).

Claim 31(original). The method of claim 29, wherein the organo-metallic solution includes:
CH2I2(Diodomethane).

Claim 32(original). The method of claim 1, wherein the metallic solution includes:
SeO2(Selenium Dioxide).

Claim 33(original). The method of claim 1, wherein the metallic solution includes:
ZnBr2 (Zinc Dibromide).

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Claim 34(currently amended). A method of generating optical emissions from metallic point sources, comprising the steps of:

forming microscopic liquid metal droplets at room temperature without heating the droplets;

passing the droplets, each having a diameter in the range of approximately 10 to approximately 100 microns, into individual target sources;

irradiating the individual target sources with a laser beam having substantially identical diameter to each of the individual droplets; and

producing optical emissions from the irradiated target sources without debris damage to surrounding components.

Claim 35(original). The method of claim 34, wherein each of the microscopic liquid metal droplets include: metallic chloride solutions.

Claim 36(original). The method of claim 34, wherein each of the microscopic liquid metal droplets include: metallic bromide solutions.

Claim 37(original). The method of claim 34, wherein each of the microscopic liquid metal droplets include: metallic sulphate solutions.

Claim 38(original). The method of claim 34, wherein each of the microscopic liquid metal droplets include: metallic nitrate solutions.

Claim 39(original). The method of claim 34, wherein each of the microscopic liquid metal droplets include: an organo-metallic solution.

Claim 40(original). The method of claim 34, wherein the room temperature includes:

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approximately 10 degrees to approximately 30 degrees C.

Claim 41(original). The method of claim 34, wherein the optical emissions include:
approximately 11.7nm.

Claim 42(original). The method of claim 34, wherein the optical emissions include:
approximately 13 nm.

Claim 43(New). The method of claim 35, wherein the metallic chloride solution
includes: ZnCl(zinc chloride).

Claim 44(New). The method of claim 35, wherein the metallic chloride solution
includes: CuCl(copper chloride).

Claim 45(New). The method of claim 35, wherein the metallic chloride solution
includes: SnCl(tin chloride).

Claim 46(New). The method of claim 34, wherein each of the microscopic liquid metal
droplets include: approximately 25% metallic solutions.

Claim 47(New). A method of producing optical emissions from liquid droplet target sources,
comprising the steps of:

- forming liquid metal droplets at room temperature;
- passing the liquid metal droplets into individual target sources; and
- irradiating the target sources with a high energy source to produce optical emissions that
are debris free and cannot cause debris damage to surrounding components.

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Claim 48(New). The method of claim 47, wherein each of the target source droplets include approximately 25% metallic solutions.

Claim 49(New). The method of claim 48, wherein each of the droplets are microscopic with a diameter of approximately 10 micrometers to approximately 100 micrometers.

Claim 50(New). The method of claim 49, wherein the diameters of the droplets are approximately 30 micrometers to approximately 90 micrometers.

Claim 51(New). The method of claim 49, wherein the diameters of the droplets are approximately 40 micrometers to approximately 80 micrometers.

Claim 52(New). The method of claim 47, wherein each of the liquid metal droplets include: metallic chloride solutions.

Claim 53(New): The method of claim 47, wherein each of the liquid metal droplets include: metallic bromide solutions.

Claim 54(New). The method of claim 47, wherein each of the liquid metal droplets include: metallic sulphate solutions.

Claim 55(New). The method of claim 47, wherein each of the liquid metal droplets include: metallic nitrate solutions.

Claim 56(New). The method of claim 47, wherein each of the liquid metal droplets include: an organo-metallic solution.

Claim 57(New). The method of claim 47, wherein the room temperature includes:

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approximately 10 degrees to approximately 30 degrees C.

Claim 58(New). The method of claim 52, wherein the metallic chloride solutions includes: ZnCl(zinc chloride).

Claim 59(New). The method of claim 52, wherein the metallic chloride solutions includes: CuCl(copper chloride).

Claim 60(New). The method of claim 52, wherein the metallic chloride solutions includes: SnCl(tin chloride).

Claim 61(New). An apparatus for generating optical emissions from liquid point sources, comprising:

- means for forming liquid metal droplets at room temperature;
- means for feeding the liquid metal droplets at room temperature into a target path to form individual target sources;
- means for irradiating the individual target sources with an optical beam; and
- means for generating optical emissions from the irradiated target sources that are debris free and cannot cause debris damage to surrounding components.

Claim 62(New). The apparatus of claim 61, wherein the irradiating means includes: a laser.

Claim 63(New). The apparatus of claim 61, wherein each of the liquid metal droplets are microscopic sized droplets have a diameter of approximately 10 micrometers to approximately 100 micrometers.

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Claim 64(New). The apparatus of claim 63, wherein the diameters of each of the liquid metal droplets are approximately 30 micrometers to approximately 90 micrometers.

Claim 65(New). The apparatus of claim 63, wherein the diameters of each of the liquid metal droplets are approximately 40 micrometers to approximately 80 micrometers.

Claim 66(New). The apparatus of claim 61, wherein the target sources include:
approximately 25% metallic solutions.

Claim 67(New). The apparatus of claim 61, wherein each of the liquid metal droplets include:
metallic chloride solutions.

Claim 68(New). The apparatus of claim 61, wherein each of the liquid metal droplets include:
metallic bromide solutions.

Claim 69(New). The apparatus of claim 61, wherein each of the liquid metal droplets include:
metallic sulphate solutions.

Claim 70(New). The apparatus of claim 61, wherein each of the liquid metal droplets include:
metallic nitrate solutions.

Claim 71(New). The apparatus of claim 61, wherein each of the liquid metal droplets include:
organo-metallic solutions.

Claim 72(New). The apparatus of claim 61, wherein the room temperature includes:
approximately 10 degrees to approximately 30 degrees C.

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Claim 73(New). The apparatus of claim 67, wherein the metallic chloride solutions includes: ZnCl(zinc chloride).

Claim 74(New). The apparatus of claim 67, wherein the metallic chloride solutions includes: CuCl(copper chloride).

Claim 75(New). The method of claim 67, wherein the metallic chloride solutions includes: SnCl(tin chloride).